

CLAIMS:

1. A mixing apparatus for mixing relatively low salinity fluid with relatively high salinity fluid, the mixing apparatus comprising:

5 a housing having an upper end and a lower end, a fluid inlet at or near the lower end, and a fluid outlet at or near the upper end, wherein the relatively high salinity fluid in use enters the housing through the fluid inlet and is discharge from the housing through the fluid outlet;

10 a feed tube having a first end connectable to a source of relatively low salinity fluid and second end for introducing relatively low salinity fluid to the housing to mix the relatively high salinity fluid with the relatively low salinity fluid to form a fluid mixture; and

15 at least one power generator associated with the housing, the power generator being driven by the mixing of the relatively high salinity fluid with the relatively low salinity fluid.

20 2. A mixing apparatus as claimed in claim 1 wherein the housing comprises a substantially vertically oriented up tube.

25 3. A mixing apparatus as claimed in claim 2 wherein the down tube has a cross-sectional area and the up tube has a cross sectional area, and the cross sectional area of the down tube is 5 - 50,000 times smaller than the cross sectional area of the up tube.

30 4. A mixing apparatus as claimed in claim 2 wherein the down tube has a cross-sectional area and the up tube has a cross sectional area, and the cross sectional area of the down tube is 50 - 2,000 times smaller than the cross sectional area of the up tube.

5. A mixing apparatus as claimed in claim 1 wherein the power generator comprises a plurality of propellers and a shaft, the propellers being located in the housing, and an electrical generator coupled to the shaft for generating electrical power.

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6. A mixing apparatus as claimed in claim 1 wherein the power generator comprises a vane drum having a plurality of vanes, wherein them plurality of vanes rotate a shaft when connected with the fluid mixture, and an electrical generator connected to the shaft.

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7. A mixing apparatus as claimed in claim 1 wherein the relatively low salinity water is selected from the group consisting of fresh water, waste water, desalination water, or a mixture of one or more thereof.

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8. A mixing apparatus as claimed in claim 1 wherein the high salinity water is selected from the group consisting ocean water, waste water, or a mixture thereof.

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9. A mixing apparatus as claimed in claim 1 comprising a plurality of power generators.

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10. A mixing apparatus as claimed in claim 9 comprising three power generators, comprising a first power generator positioned so that at least a portion of the relatively high salinity fluid which enters the housing flows therethrough, a second power generator positioned so that at least a portion of the relatively low salinity fluid in the feed tube flows therethrough, and a third power generator positioned so that at least a portion of the fluid mixture flows therethrough.

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11. A mixing apparatus as claimed in claim 2 further comprising a secondary feed tube connected to the feed tube, the secondary feed tube forming a spiral about the up tube, the secondary feed tube having a plurality of apertures therein through which fluid can flow from the secondary feed tube, the up tube having a plurality of corresponding apertures for receiving fluid from the apertures in the secondary feed tube.

12. A mixing apparatus as claimed in claim 2 further comprising an annular sleeve located about at least a portion of the up tube, a secondary feed tube extending between the sleeve and the feed tube, and communication ports between the sleeve and the up tube for fluid flow.

13. A mixing apparatus as claimed in claim 1 further comprising a first branch feed tube and a second branch feed tube, the first and second branch feed tubes extending from the feed tube and positioned within the housing so as to discharge relatively low salinity fluid at different locations within the housing.

14. A mixing apparatus as claimed in claim 2 further comprising a first branch feed tube and a second branch feed tube, a first annular ring about the up tube, a second annular ring about the up tube, the first branch feed tube connecting to the first annular ring and the second branch feed tube connecting to the second annular ring, the first and second annular rings having communication ports with the inside of the up tube to permit relatively low salinity fluid to flow from the feed tube, through the first and second branch feed tubes and first and second annular rings respectively into the up tube.

15. A mixing apparatus as claimed in claim 1 wherein the housing is located in a body of water, a first fluid source for relatively high salinity fluid is located on an adjacent land mass, the feed tube extends from the first fluid source to the inside of the housing, a second fluid source of relatively low salinity fluid is located on the land mass, and a second fluid source feed tube extends between the second fluid source and the housing, the feed tube and the second fluid source feed tube for discharging fluid into the housing to enable mixing thereof to comprise at least a part of the fluid mixture.

16. A mixing apparatus as claimed in claim 15 wherein the first or second fluid source is a waste water disposal.

17. A mixing apparatus as claimed in claim 15 wherein the first or second fluid source is a sanitation plant.

18. A mixing apparatus as claimed in claim 15 wherein the first or second fluid source is a brine.

19. A mixing apparatus as claimed in claim 15 wherein the housing is located in a body of water whose salinity is less than the first fluid source and more than the second fluid source.

20. A method for generating power from the difference in osmotic potential between a source of relatively low salinity water and a source of relatively high salinity water, said method comprising:

locating a housing in a body of fluid, the housing having an

upper end and a lower end, a fluid inlet at or near the lower end, and a fluid outlet at or near the upper end, wherein the relatively high salinity fluid enters the housing through the fluid inlet and is discharged from the housing through the fluid outlet;

5 connecting a feed tube by means of a first end thereof to a source of relatively low salinity fluid for conveyance of the fluid to a second end for introducing relatively low salinity fluid to the housing and mixing the relatively high salinity fluid with the relatively low salinity fluid to form a fluid mixture; and

10 positioning at least one power generator at or near the housing, the power generator being driven by the mixing of the relatively high salinity fluid with the relatively low salinity fluid.

21. A method as claimed in claim 20 further comprising the step
15 of locating a plurality of power generators to capture flow of water.

22. A method as claimed in claim 20 further comprising the step of introducing relatively low salinity fluid into the housing at multiple points.

20 23. The method as claimed in claim 20 wherein the mixture comprises relatively high salinity water and relatively low salinity water in a ratio of at least 8 to 1.

25 24. The method as claimed in claim 20 wherein the mixture comprises relatively high salinity water and relatively low salinity water in a ratio of at least 30 to 1.